

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE																																	
SIZING RING ITEM 2/2 103 (1) LEFT (1) RIGHT ----- 10146-05 (2)		103FM10W  Jammed open or mated with arm bearing.  Defective material: Latch, spring or sizing ring. Foreign matter in latch.	END ITEM: Unable to lock or unlock sizing ring to/from fabric attachment ring.  GFE INTERFACE: Unable to assemble or disassemble sizing insert into arm disconnect.  MISSION: Terminate EVA prep. Loss of EMU for designated crewmember.  CREW/VEHICLE: None.  TIME TO EFFECT /ACTIONS: Minutes.  TIME AVAILABLE: N/A  TIME REQUIRED: N/A  REDUNDANCY SCREENS: A-N/A B-N/A C-N/A	A. Design - The sizing ring is made of 7075-T73 Aluminum Alloy and is finished with Type II CLI anodize. A static lip seal provided for pressure retention. The seal is seated in a groove and is made of a polyurethane compound. The locking system consists of two spring loaded sequential locks and one manual lock. The locking latches are made of 7075-T73 Aluminum Alloy and the spring and retaining screws are made of stainless steel. The threaded portion of the sizing ring is designed for "one way" initiation of threaded engagement to ensure proper alignment and locking.  Normal rotation loads result in arm bearing rotation which precludes torque induced loads into the sizing rings.  The threaded portion of the sizing ring is coated with a dry film lubricant to allow smooth travel of the ring when being mated.  B. Test - Acceptance: The sizing ring is subjected to testing per ATP 10146 at Arilock with ILC source verification.  Certification: The sizing ring was successfully tested manned during SSA certification to duplicate 458 hours operational life (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the sizing ring, was documented during certification:  <table border="1"> <thead> <tr> <th>Requirement</th> <th>S/AD</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Elbow/Cycles</td> <td>49660</td> <td>102000</td> </tr> <tr> <td>Engage/Disengage</td> <td>300</td> <td>800</td> </tr> <tr> <td>Don/Doff</td> <td>98</td> <td>400</td> </tr> <tr> <td>Pressure Hours</td> <td>458</td> <td>916</td> </tr> </tbody> </table> Two acceptable alternate static seals were developed and passed certification testing (Ref. Certification Report 0111-712694). The following usage, reflecting requirements of significance to the seal, were documented during certification:  <table border="1"> <thead> <tr> <th>Requirement</th> <th>S/AD</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Engagement Cycles</td> <td>300</td> <td>600</td> </tr> <tr> <td>Pressure Hours</td> <td>458</td> <td>916</td> </tr> <tr> <td>Pressure Cycles</td> <td>194 @ 4.3 psid</td> <td>388</td> </tr> <tr> <td></td> <td>74 @ 5.3 psid</td> <td>148</td> </tr> <tr> <td></td> <td>32 @ 6.6 psid</td> <td>64</td> </tr> </tbody> </table> C. Inspection - Components and material manufactured to ILC requirements at an Approved Supplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the materials received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provides traceability	Requirement	S/AD	Actual	Elbow/Cycles	49660	102000	Engage/Disengage	300	800	Don/Doff	98	400	Pressure Hours	458	916	Requirement	S/AD	Actual	Engagement Cycles	300	600	Pressure Hours	458	916	Pressure Cycles	194 @ 4.3 psid	388		74 @ 5.3 psid	148		32 @ 6.6 psid	64
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		103FM10W		<p>information.</p> <p>The following MIPs are performed during the arm assembly manufacturing process to assure that the failure causes are precluded from the fabricated item:</p> <ol style="list-style-type: none"><li>1. Visually inspect static seal for damage.</li><li>2. Visually inspect ring for scratches, burrs.</li></ol> <p>During PDA, the following inspection points are performed at the arm assembly level per ILC Document 0111-710112:</p> <ol style="list-style-type: none"><li>1. Inspection for cleanliness to VC level.</li><li>2. Visual inspection for damage, wear or material degradation.</li><li>3. Visual inspection for damage following proof-pressure test.</li></ol> <p>D. Failure History - B-EMU-103-T003 (11/05/96). During WETF processing, arm sizing ring manual lock button would not unlock. Most probable cause was debris lodging in locking mechanism, jamming lock button. No corrective action taken.</p> <p>E. Ground Turnaround - Inspected for non-EET processing per FEMU-R-001, Pre-Flight Inspections and Final Structural and Leakage, SSA Connector Verification. None for EET processing. Additionally, every 4 years chronological time or 229 hours of manned pressurized time, the sizing ring is disassembled, cleaned, inspected, lubricated and reassembled.</p> <p>F. Operational Use - Crew Response - Pre EVA/Post EVA: Trouble shoot problem, Consider use of third EMU. If no success terminate EVA prep. EMU is no go for EVA. EVA: When CWS data confirms loss of suit pressure integrity coupled with an excessive primary O2 use rate, abort EVA.</p> <p>Training - Standard training covers this failure mode.</p> <p>Operational Consideration - Flight rules define go/no go criteria related to EMU pressure integrity and regulation. EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.</p>

EXTRAVEHICULAR MOBILITY UNIT  
SYSTEMS SAFETY REVIEW PANEL REVIEW  
FOR THE  
I-103 ARM ASSEMBLY  
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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